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IS 4217 (1981): Needle Rollers [PGD 13: Bearing]

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IS : 4217 - 1981

REAFFIRMED
2001

Indian Standard

SPECIFICATION FOR NEEDLE ROLLERS

(First Revision)

Roller Bearings Sectional Committee, EDC 39; Panel for Needle Bearings, EDC 39/P-3 [Ref : DOC : EDC 39 (3514)]

1. Scope — Specifies the requirements for needle rollers used as rolling element in needle bearings of nominal diameters up to 5 mm and the ratio of the nominal length to the nominal diameter in the range 3 to 10.

2. Definitions — For the purpose of this specification the following definitions shall apply.

2.1 *Nominal Diameter* — The diameter by which the needle rollers are designated (*see* Fig. 3).

2.2 *Mean Diameter* — The mean diameter is the arithmetic average of the values obtained from the measurement of the diameter on different points of the circumference along the length.

2.2.1 For the purpose of determining the mean diameter, measurements shall be taken at two different points at a given section of the circumference and measurements shall be made at two different sections located on the length of the needle roller (sections located at a distance equal to half the diameter of roller, from the starting of cylindrical surface on either end).

2.3 *Tolerance on Diameter* — This is the maximum permissible variation of the mean diameter from the nominal diameter. The disposition of the tolerance is normally on the negative side (*see* Table 1).

TABLE 1 SORTING DIAMETER GROUPS OF NEEDLE ROLLERS

(*Clauses* 2.3, 5 *and* 12)

1 µm = 0·001 mm

Range of Each Group µm	Designation and Tolerance of Groups µm					Tolerance Range µm
2	0 −2	−2 −4	−4 −6	−6 −8	−8 −10	10
	−1 −3	−3 −5	−5 −7	−7 −9		
3	0 −3	−2 −5	−4 −7	−6 −9	−7 −10	
5	0 −5	−3 −8	−5 −10			

2.4 *Out of Roundness* — The out of roundness is the deviation of the outline of the needle roller (that is, of the cross-section of the needle roller at right angles to the axis of rotation) to the true circle (*see* Fig. 1)

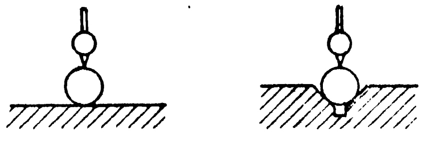

FIG. 1 OUT OF ROUNDNESS

2.4.1 Out of roundness is normally specified by the total indicator reading obtained by measurement of the roller when placed on a flat surface (two point measurement) and on a 90° V — Block (three point measurement).

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2.5 *Cylindricity Deviation* — This is the difference between the mean diameters of the needle roller in different cross-sections as indicated below (*see* Fig. 2):

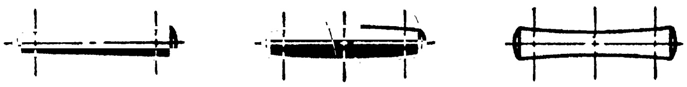


FIG. 2 CYLINDRICITY DEVIATION

2.5.1 Cylindricity deviation is of three types, namely, conicity, convexity and concavity.

2.5.2 *Conicity* — The conicity value is the difference between the two mean diameters of the two sections as specified in **2.2.1**.

2.5.3 *Convexity and Concavity* — Convexity (or concavity) value is the difference between the mean diameter of the needle roller as specified in **2.2.1** and the mean diameter at a cross-section located in the middle of the length of the needle roller.

3. Material — The material recommended for the needle rollers may be carbon chromium steel in accordance with IS : 4398-1972 'Carbon-chromium steel for the manufacture of ball rollers and bearing races (*first revision*)'.

4. Hardness — Needle rollers shall be hardened to 58 to 64 HRC when determined in accordance with IS : 1586-1968 'Methods for Rockwell hardness test (B and C scales) for steel (*first revision*)' or its equivalent in other scales.

5. Grade — The needle rollers covered in this standard are classified into three grades as per Table 2 and sorted in diameter groups as per Table 1. The required combination of grade and diameter sorting shall be mutually agreed to between the purchaser and the manufacturer.

TABLE 2 GRADING AND ACCURACY OF NEEDLE ROLLERS

(*Clauses* 5 *and* 12)

1 µm = 0·001 mm

Grade	Maximum Deviation Acceptable				
	Out of Roundness		Conicity	Convexity	Concavity
	Two point measurement µm	Three point measurement µm	µm	µm	µm
I	0·8	2	1	1	0·6
II	1	3	1·2	1·5	0·8
III	1·2	5	1·5	2·5	1

6. Dimensions — The dimensions of the needle roller shall be as given in Table 3 read with Fig. 3.

7. Shape of Ends — The shape of the ends of the needle rollers shall be as shown in Fig. 3 (*see also* IS : 2399 - 1964 Glossary of terms relating to rolling bearings) and the blending radius '*r*' shall be as given in Table 4.

8. Designation — The needle rollers conforming to this standard shall be designated by the name, nominal diameter, nominal length, shape, grade, tolerance group and the number of this standard.

Example:

Needle Roller 3 × 11·8 BP I (−2 −4) IS : 4217

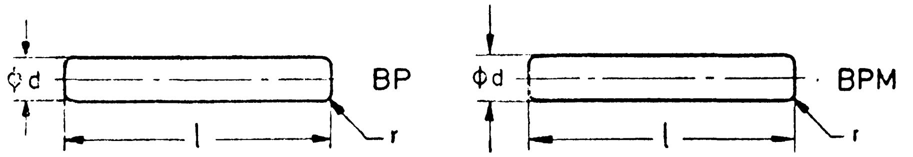
9. Manufacture — The needle rollers shall be free from cracks, flaws, rust and other injurious defects.

TABLE 3 DIMENSIONS FOR NEEDLE ROLLERS

(*Clause* 6 *and* Fig. 3)

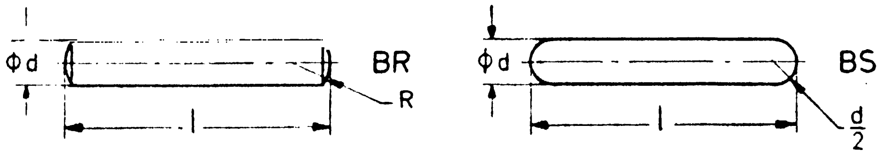
All dimensions in millimetres.

Nominal Dia *d*	Nominal Length *l* $\text{Tol}^{+0}_{-0\cdot2}$
1·5	9·8
2	5·8 7.8 9·8 11·8 13·8 15·8
2·5	7·8 9·8 11·8 13·8 15·8 19·8
3	11·8 13·8 15·8 17·8 19·8 23·8
3·5	11.8 15·8 19·8 23·8 29·8 34·8
4	17·8 23·8 29·8 39·8
5	23·8 29·8 39·8 49·8



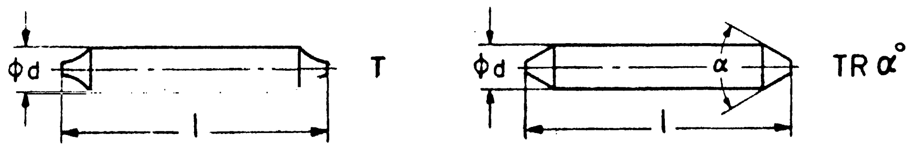
FLAT ENDS

GROUND FLAT ENDS



SPHERICAL ENDS

BALL ENDS



TRUNNION ENDS

CONICAL ENDS

FIG. 3 SHAPES OF ENDS OF NEEDLE ROLLERS

TABLE 4 BLENDING RADIUS '*r*' OF NEEDLE ROLLERS

(*Clause* 7 *and* Fig. 3)

All dimensions in millimetres.

Nominal Dia *d*		Blending Radius *r*	
Above	Up to and including	*Min*	*Max*
—	3	0·1	0·4
3	5	0·1	0·6

10. Finish — The surface roughness of the rolling surface of the needle rollers shall be $\nless$ N3 when determined in accordance with IS : 3073-1967 ' Assessment of surface roughness '.

11. Sampling and Testing — *See* Appendix A.

12. Preservation, Packing and Marking — The needle rollers shall be protected from rust and suitably packed. The packets shall be marked with the size of the needle rollers, grade, tolerance groups as per Tables 1 and 2 and manufacturer's symbol or trade-mark.

12.1 *Certification Marking* — Details available with the Bureau of Indian Standards.

APPENDIX A

(*Clause* 11)

SAMPLING AND TESTING

A-1. Lot — In any consignment, all the needle rollers of the same designation and manufactured under similar conditions of production shall be grouped to constitute a lot.

A-2. Sampling — The number of needle rollers to be selected at random from each lot for inspection shall be as per Table 5. To ensure randomness of selection, methods for random sampling to IS : 4905 - 1968 ' Methods for random sampling ' shall be followed.

TABLE 5 SAMPLING PLAN AND CRITERIA FOR CONFORMITY

Lot Size (1)	Sample Size (2)	Acceptance Number (3)	Sub-sample Size (4)	Sub-acceptance Number (5)
Up to 10 000	32	2	5	0
10 001 to 35 000	50	3	5	0
35 001 to 150 000	80	5	8	1
150 001 to 500 000	200	10	13	1
500 001 and above	315	14	20	2

A-3. Inspection

A-3.1 The random samples selected as in **A-2**, Table 5 (Col 2), shall be inspected for dimensional tolerances, workmanship and protection against corrosion as per requirements in this specification. Any needle roller failing to meet the requirement for any one or more of the above characteristics shall be declared as defective.

A-3.2 The random sub-sample selected as in Table 5 (Col 4) shall be inspected for form tolerance and hardness. Any needle roller failing to meet the requirement for any one or more of the above characteristics shall be declared as defective.

A-4. Conformity

The lot shall be considered conforming to the requirement, if the number of defectives is less than or equal to the corresponding acceptance number in Table 5 (Col 3) and (Col 5).

EXPLANATORY NOTE

This standard was first published in 1967. At the time of periodic review, the committee responsible for its preparation felt it necessary to revise it so as to bring it in line with current international practices. In this revision, a table for sorting diameter groups and sampling plan have been included, grading and accuracy of needle rollers have been revised and the non-preferred sizes of needle rollers have been excluded.

The subjects of needle cages, needle bearing and their various assemblies have been covered in separate specifications.

In the preparation of this revision, assistance has been derived from the following publications:

ISO 3076-1974 Needle roller bearings — needle rollers — dimensions — metric series.

DIN 5402 Part 3 Needle rollers.

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